phosphorescence, and many allied subjects will probably be accounted for by the discussion of resonance and forced oscillations, to which the system is susceptible.

The above results were communicated to the Physico-mathematical Society of Tokyo in December last; the details of calculation will probably appear in the *Philosophical Magazine* in the near future. H. NAGAOKA.

Physical Laboratory, Tokyo University, January 18.

Science in the Navy.

IN view of the important articles which appeared in NATURE last year on the question of science in the navy, it seems desirable to inquire into the amount of encouragement which is now given to young lieutenants to adopt either of the more scientific branches of their profession.

Apart from zeal for the service and the love of knowledge, the most potent incentive to their doing so lies in the promise of early promotion to commander. Now, of the thirty-five lieutenants promoted on January 1 last, the following analysis will show that the more scientific officer has no advantage over his fellow as regards promotion. The periods between promotion to lieutenant and to commander were:—

	12	Lieutenants of the general service	10·8 years.
Lieutenants of special attainments	8 ,,	Gunnery officers ...	10·9 ,,
	6 ,,	Torpedo ,, ...	10·8 ,,
	9 ,,	Navigating ,, ...	11·9 ,,

From the above it is evident that no advantage accrued to those who had the ability to attain the scientific knowledge required for their respective branches, whilst the future of those who selected navigation was marred by having to wait a year longer than any other officer.

Lastly, it may be remarked that it argues well for a service in which science is courted by so many in spite of the small encouragement given in this matter of promotion.

N. G. T.

Organisms and Meteorites.

I SHOULD be glad to know whether anyone has ever attempted to test the hypothesis of Helmholtz and Lord Kelvin that meteorites are possibly the carriers of organised matter. By pulverising a portion taken from the interior of a meteorite it would, I should suppose, be easy to dissolve out and detect any organic matter that was there. The result in any particular case would probably be negative; still, wilder experiments have been tried before now. JAMES WARD.

Trinity College, Cambridge, February 15.

The Gordiidæ in Folk-lore.

THE sudden appearance of the Gordiidæ or hair worms in puddles of water or similar situations has caused the primitive peoples of many countries to evolve a theory of their seemingly mysterious origin. In parts of Scotland they are believed to be the intermediate stage in the development of a horse-hair into an eel; in Iceland and the Færöes, and also in some of the Malayan islands, they are thought to come down with the rain; in the Malay Peninsula they are said to be the offspring of an unnatural union between an earthworm and a female mantis, and to turn into a fern (Lygodium sp.), the creeping rhizome of which some of them (for example, *Chorodes montoni*, Camer.) closely resemble. (I found that a very large proportion of the true Mantidæ were infested by them in the Malay States.) In the same country, by an application of the principle of the doctrine of signatures, they are used in the manufacture of a hair-wash. I have thought that it might be interesting to trace out the beliefs held about them among different races, but I find references to them extremely scanty in ethnographical or general literature. If any of your correspondents could furnish information of the kind I would be extremely grateful, for I believe that an interesting contribution to the biological philosophy of savages might be made by collecting and analysing the different theories held by primitive peoples regarding a small and easily recognised group of animals like the Gordiidæ. NELSON ANNANDALE.

34 Charlotte Square, Edinburgh.

THE ANTARCTIC EXPEDITIONS.

MORE or less detailed accounts have now been published of all the three expeditions—German, Swedish, and Scottish—which, following the lead of the British party in the *Discovery*, have during the past two years striven to extend the bounds of knowledge in the far southern regions. Some idea can therefore be gained of the scientific results obtained in various directions. It is a remarkable illustration of the independence of climatic conditions on mere latitude that, while each of the expeditions wintered outside the Antarctic circle, the rigours experienced have hardly been exceeded in the case of expeditions which have wintered more than 10° nearer the pole in both hemispheres.

To begin with the work of the Swedish party under Dr. Nordenskjöld, of which summaries have been given both in the *Times* and in the *Geographical Journal*, it is mainly of the contributions to meteorology and geology that it is yet possible to speak, though when the magnetic observations have been worked out, results of no less importance may be expected. The value both of the meteorological and magnetic work has been greatly enhanced by the enforced detention during two winters, a much more effective basis of comparison with the observations of other expeditions and stations being thus supplied. Some useful work from a purely geographical point of view has also been accomplished, our knowledge of the contours of the land masses to the south of South America having received welcome additions, mainly as the result of two separate sledge expeditions undertaken during the two winters. The winter station, it will be remembered, was established on the eastern side of Louis Philippe Land, the northern extremity of the mass known further south as Graham Land. It was itself on an island lying to the east of the main mass, but although this appears to be fringed on this side by a regular archipelago of islands separated by wide channels, it was demonstrated—and this is one of the chief geographical results of the expedition—that the larger mass runs continuously southward from Louis Philippe Land to King Oscar Land. It is formed by a high range of mountain peaks separated by large glaciers, and further inland passing into a level ice-covered plateau. Within the outer limit of the archipelago an ice-sheet extended, bounded by a formidable ice barrier running from east to west in the neighbourhood of Christensen Island (an extinct volcano). The conditions of this ice-sheet recalled those of Ross's great ice-barrier on the opposite side of the Antarctic, and, as was found by Captain Scott and his companions on their great southern sledge journey, it was separated from the land by wide, deep, and impassable crevasses. This was ascertained during the first winter expedition, which lasted from September 30 to November 7, 1902, and had its furthest point in 66° S., 62° W. During the second winter the leader, with one companion only, explored the channels leading north behind the islands towards Erebus Gulf. The scenery here was found to be of the grandest kind; on one side was the magnificent range of King Oscar Land, on the other a large archipelago forming a remarkable contrast to the former, and made up of tufaceous volcanic rocks, with sounds, glaciers, and promontories, all dominated by the shining blue-white prominent peak of Mount Haddington, probably formed by a mighty crater. It was during this expedition that Dr. Nordenskjöld luckily fell in with Dr. Andersson and Lieut. Duse, who had left the *Antarctic* before the disaster which befel it, and had spent the winter in that inhospitable region with only a summer outfit.

Throughout the time spent in the far south, the

climatic conditions were generally adverse, the violent gales and great cold experienced during the first winter equalling, if not surpassing, those which so hampered the work of the Newnes Expedition to Victoria Land. During a whole fortnight in May and June the velocity of the wind averaged 45 miles per hour, and, worse than all, it was these south-westerly gales which brought with them the lowest temperatures. Thus the stormiest day (mean velocity 63 miles) was also one of the coldest (mean −24° F.). The mean temperature for the year was about 10·2° F., the same as in Hudson Strait or at Yakutsk, the two coldest places in the north, while the summer showed the exceptionally low mean of 28·2° F., the coldest so far known. In the summer, however, the gales became very much more moderate, being insufficient, in fact, during the first year, to break up the ice—the reason for the failure of the *Antarctic* to reach the winter station; and whereas in winter the snow was all blown away by the gales, in summer a great accumulation of snow was observed on the ice at sea-level. During the whole two years not a single aurora was observed. From a geological point of view the most interesting discovery was that of numerous fossil bones of vertebrate animals, some of great size, while abundant remains of plants were also found, proving that, as in the far north, the climate was once mild, and that there existed large forests of leaf-bearing trees where birds sang and strange large animals fed on the herbage. The fossils in the islands round the station were all of Mesozoic or Tertiary age, but Dr. Andersson had discovered, in the neighbourhood of his winter quarters, a rich fossil flora of a very different type, belonging to an older geological epoch.

Mr. Bruce likewise had much to contend against in the climatic conditions, which seem to have been exceptionally unfavourable during 1903. The results of the work of his party consist mainly—in addition to the full records of magnetic and meteorological observations kept up throughout the winter—of a series of soundings and other scientific observations carried out during a cruise of more than 5000 miles in seas never before visited by a scientific expedition, and of observations on the zoology and botany of the South Orkneys. The result of the soundings was to confirm the conclusion derived from Ross's single sounding further east, showing that between 60° and 71° there is a deep sea with a more or less uniform depth of 2500 fathoms. During this cruise the heaviness of the pack—the ice being real Polar ice, sometimes 15 to 20 feet thick—proved a serious obstacle, and it was only by working eastward along the outer edge of the pack, sometimes north, sometimes south of 60°, that it was at last possible to make a clear run to the south, which took the ship to 70° 21′ S., 17° W., where a sounding of 2543 fathoms was obtained. This was towards the end of February, after which winter quarters were sought in the South Orkneys, the position chosen being a bay on the south coast of Laurie Island. Here the ship remained frozen in for eight months, a fact, Mr. Bruce says, "perhaps one of the most remarkable in the history of Polar exploration—that in an oceanic island in so low a latitude as 60°–61° it was possible to be ice-bound for so long a period." It was probably due to the continuous ice-sheet which formed between the islands and Graham's Land, which had the same effect, temporarily, as the vicinity of a continent. Eventually the ice broke up and cleared out in a single day (November 23). At the winter station a solidly built stone dwelling house was erected and a special magnetic observatory (named after Prof. Copeland), the observations at which, as also the meteorological work, were carried on by Mr. Mossman. Survey work, soundings and tidal observations were also carried on by Mr. Bruce, Mr. Wilton, and the ship's crew. During the spring, foggy and cloudy weather was very prevalent, causing many hindrances, while the rapid variations in temperature—sometimes as much as 40°–60° F. in a single day—were also very trying.

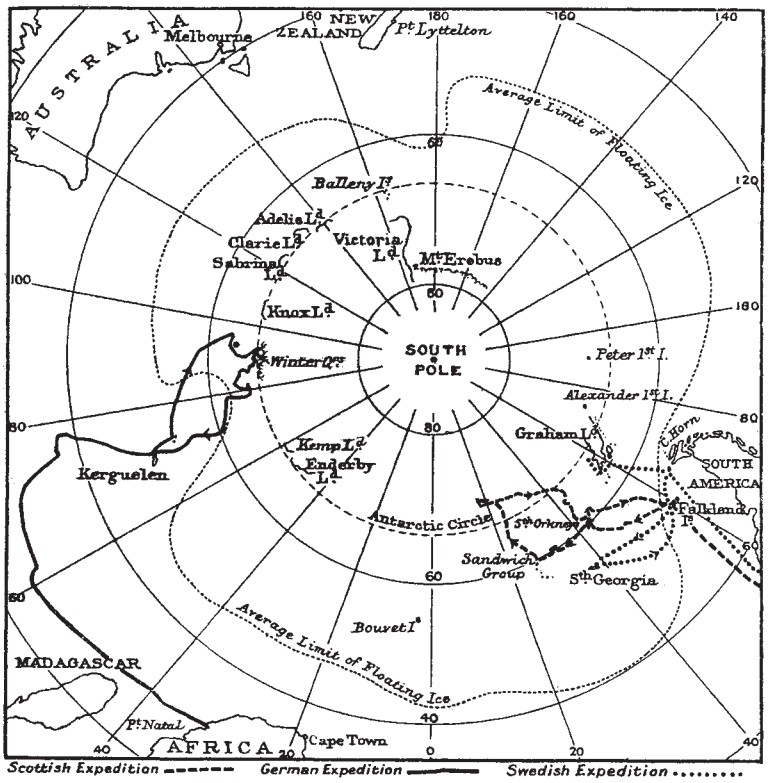

FIG. 1.—Routes of Scottish, German and Swedish Antarctic Expeditions.

All the land is described as very precipitous, rising sheer out of the water, but in spite of this the penguins manage somehow to ascend. Among the zoological facts collected, it was ascertained that the shag which inhabits Antarctic islands is the blue-eyed shag. It is hoped the work of the expedition may be continued for another year.

As regards the German expedition, Dr. Drygalski's preliminary report issued last summer has been supplemented by the publication of the first instalment of the scientific results, while a general account of the expedition has also been given before the Berlin Geographical Society and printed in the *Zeitschrift* of that body (1904, No. 1). It is again in the field of meteorology that some of the most important work has been achieved. The climatic conditions at the winter station of the *Gauss* showed clearly that the zone of the west winds had been left behind and a new climatic

area approached, marked by east winds blowing from a continental region of high pressure in the south. The storms so characteristic of the south polar region were here experienced in their full force. Although the only land actually inspected was the solitary peak of the "Gaussberg," the whole character of the neighbourhood, with its vast sheet of "inland-ice," was such as to argue the existence of a continental mass stretching southward from the Antarctic circle. The ancient crystalline character of the rocks and the sudden fall towards a deep sea in the north point in the same direction. Valuable observations of the ice-conditions, both of the sea and land areas, were made, and the paper in the *Zeitschrift* is accompanied by excellent photographic representations, one showing the stratified formation of an iceberg being especially noteworthy.

THE "FISH HYPOTHESIS" AND THE TRANSMISSION OF LEPROSY.

LEPROSY is a disease that has been known from the earliest times, and in the British Isles was very prevalent in the twelfth and thirteenth centuries. At the present time, though unknown in many countries, it is impossible to traverse any large tract in any continent without meeting with cases, Norway, the Mediterranean littoral, India, China, certain of the Pacific islands and various parts of America and Africa being preeminently the seats of the disease. A bacillus having a strong resemblance to the tubercle bacillus is present in enormous numbers in the leprous tissues, and is regarded as the specific virus, though it is non-inoculable into animals, and, with doubtful exceptions, has never been cultivated.

The transmission of the disease is generally regarded as being due to personal contagion, and there are many facts in support of this view. Segregation of the lepers is believed to be eradicating the disease in Norway; the introduction of a case of leprosy into a place previously free has been followed by a great spread of the disease, as in the Loyalty Islands, and many instances are on record of persons contracting the disease after associating in some way with the sick, whose secretions swarm with the bacilli.

For some months past, Mr. Jonathan Hutchinson, F.R.S., has been strenuously maintaining his "fish hypothesis" of the origin and transmission of leprosy with an ardour and with a wealth of facts and figures that must strike all with admiration. Moreover, Mr. Hutchinson has recently undertaken two journeys, to India and to the Cape, in order to collect data in support of his hypothesis, no light undertakings for a man of his years! Briefly stated in his own words, "the fish hypothesis assumes that in all ages and in all countries, leprosy has been and still is due in the main to the consumption as food of decomposing or imperfectly cured fish. It is thought probable that the disease is a modification of tuberculosis, and that it receives modification in connection with some specific virus (toxin or bacillus) which is occasionally, but by no means frequently, developed in connection with such fish. It assumes that, if the virus be present, a very small quantity of fish may suffice to produce the disease in its full vigour, whilst, if it be absent, large quantities may be habitually consumed without any result. It is a specific poisoning which occurs, and by no means merely a form of ill-health due to unwholesome diet. It has no degrees of less or more, and is either contracted in its totality or wholly escaped. Thus, all who eat fish in bad condition are supposed to run some risk; and those who eat it habitually and largely encounter that risk more frequently than others. It is, however, the quality and not the quantity with which chiefly we are concerned—the presence or absence of the specific virus. For the present the existence of such a virus is a matter of hypothesis, for it has never been isolated from any specimen of fish. Thus the evidence is circumstantial, not demonstrative."

Mr. Hutchinson has directed attention to the incidence of leprosy among Roman Catholic communities; this he attributes to the use of fish during the fasts ordained by that Church. Believing, as he does, that personal contagion plays little or no part in the spread of the disease, he advocates the abolition of leper asylums or at least a great mitigation in the severity of the laws as regards segregation, especially in Cape Colony.

Mr. Hutchinson's hypothesis is doubtless supported by many facts, and there is a remarkable coincidence between fish-eating and leprous districts. Thus in India generally the incidence of leprosy is about three or four cases per 10,000 of the population, but in the island of Minicoy, devoted to fishing, it rises to 150, and in Kaligoan, a fish-curing centre, to 500. The decline of leprosy in the British Isles he would attribute to the improvement in the food of the people and to the introduction of the reformed faith, whereby fasting was abolished. There are, however, grave difficulties in the way of accepting the fish hypothesis as proved. It is almost certain that leprosy is met with among peoples who rarely or never touch fish, *e.g.* the Basutos, as pointed out by Dr. Turner. Mr. Hutchinson has controverted this statement, alleging that Dr. Turner's witnesses were not to be believed, but surely the same argument may be applied to much of Mr. Hutchinson's own evidence. Mr. Hutchinson states that on several occasions he has by cross-examination obtained an admission of fish-eating that had previously been denied. But the cross-examination of an ignorant and perhaps terror-stricken native by a casual visitor is hardly calculated to elicit the truth, and must be carried out with the greatest circumspection or the examinee will infallibly admit that which he believes is required of him. On this ground much of Mr. Hutchinson's evidence must be regarded as untrustworthy. Then there is the difficulty as to why fish in bad condition conveys the disease, whereas good fish, fresh or dried, is innocuous. Why is the virus present in bad fish and not in fresh fish, where does it come from, and how does it get there? These are questions that require an answer, for it is admitted that the leprosy bacillus has never been met with apart from the leprous person; there is absolutely no proof, or even suspicion, that fish harbour the leprosy bacillus. Orkney and Shetland formerly suffered greatly from leprosy, but Mr. Traill Skae, in a letter to the *British Medical Journal*, entirely denies that the food of the people has much improved and asserts that enormous quantities of bad fish are still consumed. It would seem much more likely that the civilisation of a people that will eat bad fish is low and that promiscuous intercourse of all kinds is, therefore, habitual, leading more readily to personal contagion; this would explain the connection, if there be one, between the consumption of bad fish and leprosy.

As regards segregation being useless, Dr. Ehlers states that in Iceland, during the five years after the opening of the asylum in 1899, the number of lepers, which had previously been increasing, diminished by one-fourth. The statement that segregation is useless is against all experience, though there is, doubtless, much to be said for a modified form of segregation and for a revision of the leprosy enactments in Cape Colony.

With regard to the remarkable waxing and waning of leprosy in many countries, this is seen in nearly every